

THURSDAY, FEBRUARY 21, 1895.

SIR ANDREW CROMBIE RAMSAY.

Memoir of Sir Andrew Crombie Ramsay. By Sir Archibald Geikie. (London: Macmillan and Co., 1895.)

THE memoir of Sir Andrew Crombie Ramsay, by Sir Archibald Geikie, is a valuable addition to literature and to science. We will refer our readers to the book itself to learn when Sir Andrew was born and when he died: what support the theories of heredity obtain from the scientific tendencies and noble courage of his parents and fore-elders: who were the teachers and friends, and what were the surroundings of his early years: what, in fact, made Ramsay such as we find him in later life—a prominent person in whatever circumstances he was thrown, whether in the small society of a provincial town or in scientific gatherings in London—a welcome guest at every table, a critic whom any author bolstering up wild theories with bad evidence would fear to have to reckon with. “Of an eminently social temperament, he made acquaintances easily wherever he went, and these chance acquaintanceships sometimes ripened into lifelong friendships. In one family circle we find him reading aloud Shakespeare, or Scottish ballads, or a good novel; in another, he takes part, heart and soul, in singing glees and madrigals; in a third, he joins in dancing and all kinds of merriment.” “English literature was to him a vast and exhaustless garden, full of alleys green and sunny arbours, where from boyhood he had been wont to spend many a delightful hour. When he found among his colleagues one whose talk was not always of stones, but who had ranged like himself far and wide in literary fields, he opened out his inner soul, and his conversation glowed with an animation and power, as well as a gleeful exuberance, which astonished and charmed his companion.” And “though he was not in any sense an antiquary, he knew a good deal about the history of architecture, and took a keen delight in visiting ruins and trying to form a mental picture of what they must have been before the gnawing tooth of time had dismantled them. Whatever, indeed, linked him with the past had a charm for him. He never willingly missed an opportunity of seeing a ruined castle or keep, a mouldering abbey, a grass-grown encampment, or a lonely cairn. If tradition or song invested any spot with a living interest, he would not consider his geological inspection complete if it had not included a visit to that site.” With his quick sympathy and conversational powers, with his wide knowledge of nature, as well as of history and her monuments, no wonder that he was welcome in any society of intelligence and culture. He would unbend in congenial and sympathetic company, like a strong man who had been out in the cold and had at last gained a warm fireside, but he always made room for others round the fire. His impulsive and generous nature was, however, tempered with native judgment and caution. He soon gauged the character of those with whom he was thrown, and quickly estimated the amount of receptivity and the temper of an audience.

These qualities and acquirements with a strong and clear memory gave him much wealth of illustration in scientific discussion and in lectures. But his power lay more in the lucid exposition of his subject, the keen insight into the real points at issue, and the clearness with which he brought forward his array of facts and arguments. After one of his lectures at the Royal Institution, Faraday ran up to him, shook him by both hands, and asked “where did you learn to lecture?”

In the memoir will be found an account of his appointment to the chair of Geology at University College, from which he was always spoken of as Prof. Ramsay; also of his lectures there and elsewhere, and of his various other literary work.

In 1841 he was appointed Assistant Geologist on the Government Survey, under Sir Henry De la Beche, and throughout his forty years of service he was more and more identified with all its active work, either as himself taking part in the mapping, or as superintending others, though it was not until he had been appointed Director-General, in succession to Sir Roderick Murchison, that he officially represented the Survey to the public and the Government. An account of his life is therefore the history of the Survey, and no one is more competent than our author to tell the story.

The great difference between the work which has to be done by the Geological Survey and by amateurs is this. The amateur may examine a district in more or less detail, may pick out the points of interest, or the facts which illustrate some theory which he is developing, but, where he sees nothing, he may say nothing about it. The Geological Surveyor, on the other hand, must colour all his map, and sometimes has to put in by inference whole formations of which he has seen nothing whatever.

“He spends the day, map in hand, over the ground assigned to him for survey. Every exposure of rock is noted by him on his map or in his note-book, with all the needful details. Each stream is followed step by step up to its source; each hill-side and ravine is traversed from end to end; each quarry, sometimes each ditch, and even the very furrows and turned-up soil of a ploughed field are scrutinised in turn. . . . He is brought into every variety of scenery, and is compelled by his very duties to study these varieties and make use of them in his daily work.”

But even after all this careful search it often happens that he can find no direct evidence of the solid rocks below the soil and subsoils. He has to plot sections and see what, with the known thicknesses and dips, should be found there. He has to examine the surrounding country to see what occurs in the same relative position elsewhere, and whether any lines of disturbance which might complicate the results are running into the area respecting which, with little evidence, he must make up his mind and say something. The survey work is thus a grand training in the faculty of keeping one's wits about one, and of detecting sources of error. The habit of mind thus formed is often exhibited in the criticism of amateur work by trained survey men, and many can recall Ramsay's indignant protests against impossible or exaggerated sections when appealed to as evidence in support of any view.

He had a wonderful “eye for a country,” to use one of

his own favourite expressions. He rapidly took in the lie and relation to one another of the rock masses. To this any geologist who has worked with him in the field can testify, and this is what lends its value to his classical memoir on the geology of North Wales, and to the maps and sections of which it is explanatory. But when he had sketched out the outlines of the history of the ancient volcanoes of that area, and had noted the choked craters now exposed by the denudation of the overlying masses of lava and cinder and mud, and when he had described the isolated portions of the volcanic and marine deposits which, building up mountains round the ancient roots of the volcano, still remained the record of great sheets that once spread continuously far and wide over the whole area; when he had done all this, he turned to another aspect of the question, and sought a clear answer to the inquiry how much rock, which we know surely once covered this area, has been removed by denudation? and we find in the same memoir sections illustrating the conclusions at which he had arrived.

For when "he had traced out the structure of a complicated geological region, and was able to show what should have been the form of the surface had it depended on geological structure," he was then "in a position to demonstrate how much material had been removed by denudation," namely, all that was above what he called the *Plain of Marine Denudation*, that is the old base level of ancient erosion, down to which all the agents of waste—rain, rivers, ice, and sea—had reduced the uplifted land; or perhaps, as we should now say, giving greater prominence to subaerial action, to the level at which the sea had arrested the work of the various agents that were reducing all dry lands to sea level.

Few men's work illustrates better than Ramsay's the place and value of a good "working hypothesis" in some kinds of higher scientific research. Imaginative and fertile in suggestion, no one was more sorry when further observations did not clearly support his first impressions, and he tried and tried and tried again to make it fit; yet he bowed always with deference to established evidence and logical consequence.

Besides his regular survey work, which was itself full of new observations and original treatment, and besides many papers giving the results of his researches on special points, he from time to time plunged into more speculative questions, and advanced some theory in explanation of the larger phenomena, especially those connected with surface configuration. For instance, reflecting on the great quantity of fine mud, "flour of rock," carried down by glaciers, and observing that ice was not, like water, restricted in its flow to continuous downward slopes, and holding that ice charged with stones would grind away more rock where the pressure was greater or the rock softer, he propounded the theory of the glacial erosion of rock basins.

His explanation is probably true in some cases, but he gave it a wider application than has been borne out by subsequent investigations.

Unfortunately he adduced as his first example the Lake of Geneva, a basin to which even those who agree with him upon the general probability of there being glacially eroded hollows such as his theory requires, would not now be prepared to apply it.

The public will read with profit and pleasure the biography of such a striking personality by a graceful and accomplished writer, who knew all about the man and his work, and had the skill to select with judgment and the good sense to keep the whole within the modest bounds of one volume of large print. Ramsay's many friends will love to have the record of his struggles and his triumphs, so many of which are told in his own words. Every survey man, not only of Great Britain, but throughout the world, will turn to this account of the commencement and growth of the geological survey of Great Britain, and cannot fail to profit by the insight it gives into the methods, life, difficulties, and results of that important branch of the public service.

So easily does the story run, that we cannot say whether the general reader, or the scientific student, will be-t appreciate this sketch of the progress of geological research through the most active and interesting half-century of its history.

OUR BOOK SHELF.

Harvard College by an Oxonian. By George Birkbeck Hill, D.C.L. (London: Macmillan and Co., 1894.)

DR. BIRKBECK HILL spent two months in 1893 in Cambridge, Massachusetts, and has compiled this little volume giving some account of the history of the celebrated college and university of Harvard. So far as Dr. Hill relies upon previous publications, his account is accurate, but his own observations and impressions are—as is very natural—often quite erroneous. Scant justice is done to the important and costly arrangements for the study of the various branches of the natural sciences which exist either at or in connection with the Massachusetts university. Dr. Hill is not fitted by his own education and experience to report on these matters, nor, indeed, can much value be attached to his somewhat antiquated standpoint as a critic or observer of university institutions. He contrasts Oxford and Harvard at every step, but he fails to give any picture or presentation of the real characteristics of the student's life at Harvard. He does not sufficiently emphasise the fact that the undergraduate at Harvard enjoys the immense benefit of true *university* education, at the hands of distinguished professors, with freedom and independence in regard to his choice and method of study, and as to such personal details of life as board and lodging; whereas the Oxford undergraduate is treated throughout his career as a goose to be nursed, monopolised and plucked by college ushers, who (owing to the system under which they are appointed) are, as a rule, as little capable of good teaching as they are of managing the domestic and disciplinary details of the collegeboarding-houses. Dr. Hill notes that the rage for athletics is almost as serious an injury to study at Harvard as it is at Oxford. L.

Tableau Métrique de Logarithmes. By C. Dumesnil. (Paris: Librairie Hachette and Co., 1894.)

THE use of logarithms for calculations is, as every one knows, a great saving of labour and time, and what otherwise would be complicated pieces of work are reduced to simple computations. The facility of working depends, after some time, on the good or bad arrangement of the tables, but instances often occur where much time is lost by having to turn pages backward and forward. For the case of logarithms to five places of decimals, M. Dumesnil has devised a means of eliminating altogether the use of tables, by adopting a series of scales neatly printed on stout sheets. From